

Introduction to Botany. Lecture 28

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Outline

1 Questions and answers

2 Seeds and fruits

- Seeds
- Fruits

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2 Seeds and fruits

- Seeds
- Fruits

Previous final question: the answer

How to distinguish between inflorescence and flower?

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How to distinguish between inflorescence and flower?

- Go deeper and find out if smaller structures with three zones (flowers!) exist

Seeds and fruits

Seeds

Definition

- “Mature ovule”
- Chimeric organ consists of seed coat, endosperm and embryo

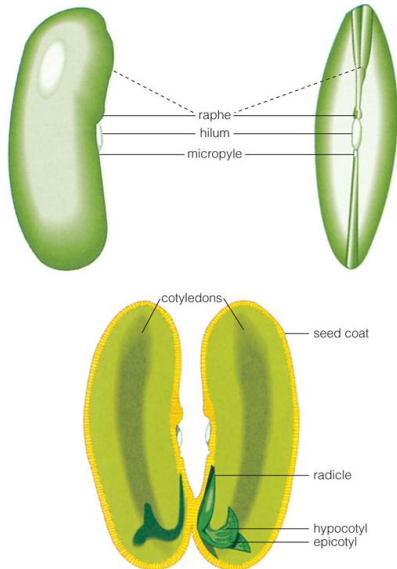
Origin of seed layers

Layer	Ploidy	Origin
Seed coat	$2n$	Integument of ovule
Endosperm ₂	$3n$, sometimes $2n$	Fertilized central cell of embryo sac
Embryo	$2n$	Fertilized egg
Endosperm ₁	n	Female gametophyte (gymnosperms!)
Perisperm	$2n$	Nucellus of ovule

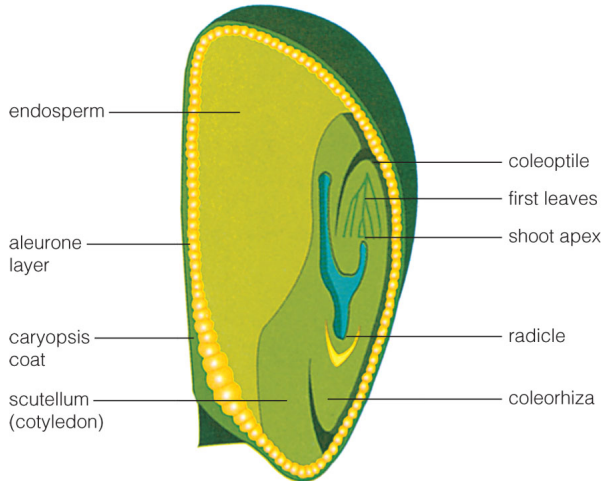
Seed structure variations

- Seed with endosperm (onion): cotyledon, radicle, apex
- Seed without endosperm (beans and other Leguminosae): cotyledons, radicle, hilum, raphe
- Grass (Gramineae) seeds: coleoptile, coleorhiza, scutellum

Bean seed



Grass seeds



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Cotyledons

- Monocots have lateral bud and terminal primary leaf (cotyledon)
- Other seed plants have terminal bud and multiple (2 to many) primary leaves (cotyledons)

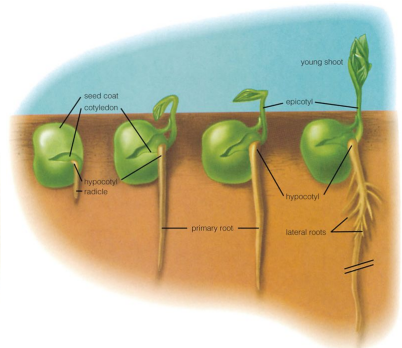
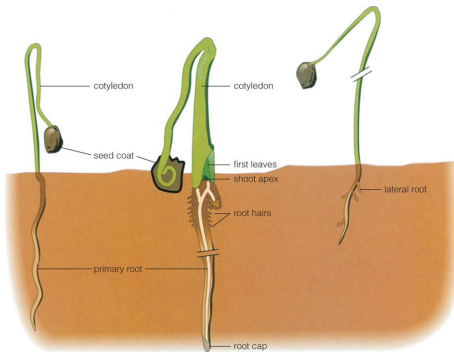
Pinus sp.: multiple cotyledons



Germination

- Epigeal (e.g., onion, pea)
- Hypogeal (e.g., bean, grasses, palms)

Epigeal *versus* hypogeal germination



Seeds and fruits

Fruits

Definition and origin

- **Fruit** is a ripened ovary, flower or inflorescence
- Fruit coat and pericarp (exocarp + mesocarp + endocarp)
origin mostly from pistil wall

Trivial classification: criteria

- Simple, multiple (aggregate) or compound
- Dry or fleshy
- Dehiscent, indehiscent or schizocarpic

Multiple fruit of *Fragaria* sp. (strawberry)



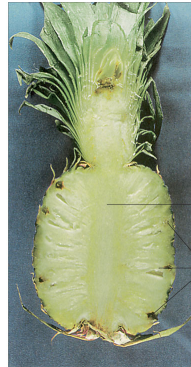
Multiple fruit of *Rubus* sp. (raspberry)



Compound fruit of *Ananas comosus* (pineapple)



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Compound fruit of *Ficus carica* (fig tree)



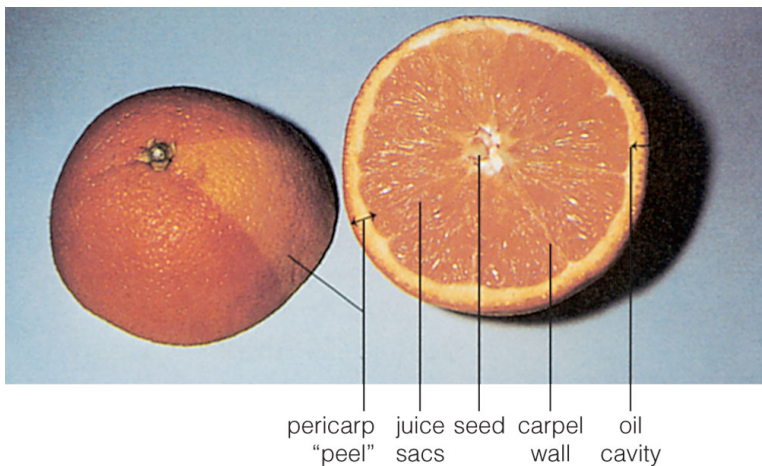
Schizocarp of *Zizia*



Trivial classification: examples

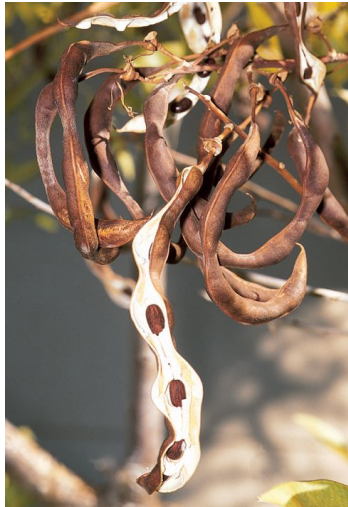
Type	Consistency	Opening	Example
Simple	Fleshy	Indehiscent	Drupe, Berry, Hesperidium, Pome
Simple	Dry	Dehiscent	Legume (pod), Capsule, Silique
Simple	Dry	Schizocarpic	Regma, Samara, Shizocarp
Simple	Dry	Indehiscent	Caryopsis (grain), Nut (incl. acorn), Achene
Multiple	Fleshy	Indehiscent	Multiple drupe
Multiple	Dry	Dehiscent	Follicle
Multiple	Dry	Indehiscent	Multiple nut
Compound	Fleshy	Indehiscent	Compound berry
Compound	Dry	Indehiscent	Compound nut

Simple, fleshy, indehiscent: **hesperidium** of *Citrus*

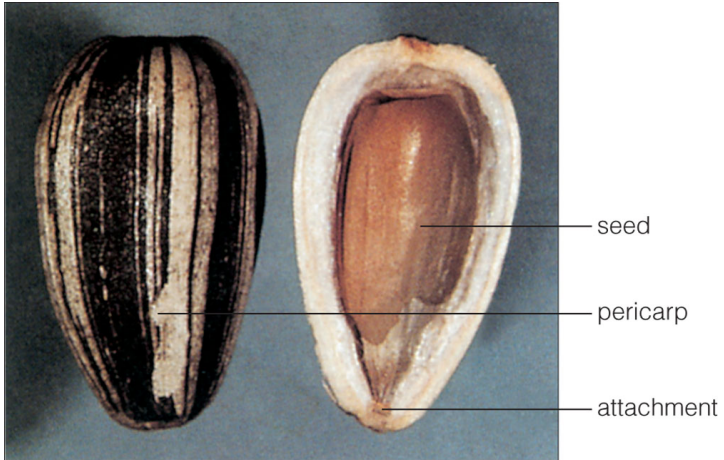


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Simple, dry, dehiscent: **legume** of *Erythrina*



Simple, dry, indehiscent: **achene** of *Helianthus*

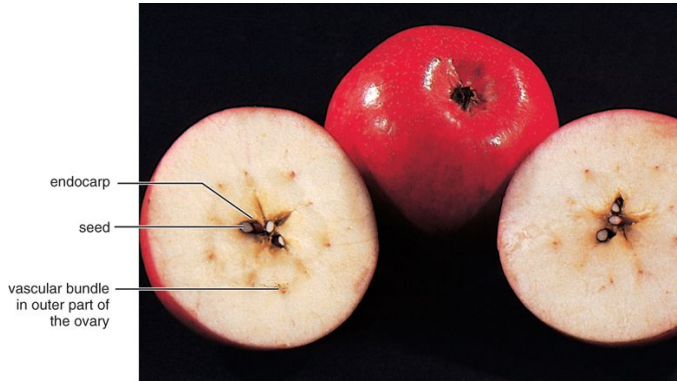


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Alternative classification of Spjut (1994)

- Simple indehiscent fruits
- Rhexocarpic (dehiscent) fruits
- Schizocarpic fruits: samara etc.
- Multiple fruits
 - Discocarpi: pomes
 - Etairionari: follicles, strawberries etc.
- Compound fruits
 - Cryptocarpi: fig
 - Phenocarpi: pineapple
 - Anthecocarpi: grasses

Discocarpi: pome of *Pyrus*



Summary

- **Seed** is a chimeric organ consists of seed coat, endosperm and embryo
- **Fruit** is a ripened ovary, flower or inflorescence

Final question (3 points)

Final question (3 points)

What is better—hypogeal or epigeal germination? Why?

For Further Reading



J. E. Bidlack, Sh. H. Jansky.
Stern's introductory plant biology. 12th edition.
McGraw-Hill, 2011.
Chapter 8.



Th. L. Rost, M. G. Barbour, C. R. Stocking, T. M. Murphy.
Plant Biology. 2nd edition.
Thomson Brooks/Cole, 2006.
Chapter 14.